

DISCUSSION OF THE AMENDMENT

Due to the length of the specification herein, Applicants will cite to the paragraph number of the published patent application (PG Pub) of the present application, i.e., US 2005/0148753, when discussing the application description, both in this section and in the Remarks section, *infra*, rather than to page and line of the specification as filed.

The specification has been amended by correcting typographical errors in which reference to components D) and E) were reversed. The error is self-evident, since only component D) has an NCO equivalent, and component E) has an active hydrogen atom.

Claim 1 has been amended by incorporating the subject matter of Claim 5 therein with regard to components A) through E), except that the minimum molecular weight for component A) is 600, as supported by original Claim 5, the acronym for component C) is corrected to --DMPA--, and component D) comprises both hexamethylene diisocyanate and isophorone diisocyanate; by deleting the numerical ranges for the components; by deleting the proviso and the molar ratio; and by adding a ratio of NCO equivalent to equivalent of active hydrogen atoms, as supported in the specification at paragraph [0187], as corrected by the above-discussed amendment to the specification.

Claim 4 has been amended to require, in effect, the presence of component E), and thus to be consistent with the above-discussed amendment to Claim 1, and by inserting the proviso from Claim 1. Claims 13 and 17 have been amended to depend on Claim 1.

New Claim 21 has been added, which percentage ranges are supported by Claim 1 prior to the above-discussed amendment, except that the minimum amount for component E) is consistent with the above-discussed amendment to Claim 4.

Claims 2, 3, 5, 11-12, 15 and 16 have been canceled.

No matter is believed to have been added by the above amendment. Claims 1, 4, 6-10, 13, 14 and 17-21 are now pending in the application.

REMARKS

Applicants thank the Examiner for the courtesy extended to Applicants' attorney during the interview held December 8, 2008, in the above-identified application. During the interview, Applicants' attorney requested that the Examiner provide the basis for the molar ratios calculated and discussed in the Office Action at the paragraph bridging pages 10 and 11 thereof. However, the discussion is now irrelevant, in view of the above-discussed amendment.

The rejections under 35 U.S.C. § 103(a) of:

Claims 1-20 as unpatentable over US 4,992,507 (Coogan et al);

Claims 1-3, 5 and 7-10 as unpatentable over Coogan et al in view of US 6,524,564 (Kim et al); and

Claims 1-20 as unpatentable over Coogan et al in view of US 6,566,438 (Ingrisch et al),

are respectfully traversed.

As recited in above-amended Claim 1, an embodiment of the present-claimed invention is a crosslinked polyurethane obtained by reacting components of a composition comprising

- A) at least one polytetrahydrofuran with a molecular weight of from 600 to 3000,
 - B) trimethylolpropane (TMP),
 - C) dimethylolpropanoic acid (DMPA),
 - D) hexamethylene diisocyanate and isophorone diisocyanate, and
 - E) neopentyl glycol,
- or a salt thereof,

wherein components are present in amounts such that the ratio of NCO equivalent of the compounds of component D) to equivalent of active hydrogen atoms of components A), B), C) and E) is in a range of 0.8:1 to 1.15:1.

As previously explained, Coogan et al discloses a free acid group- or free tertiary amino group- containing water-dispersible polyurethane (column 1, lines 8-12), wherein the free acid group containing polyurethane is the reaction product of: (A) a nonionic-water-dispersible, isocyanate-terminated polyurethane prepolymer formed by reacting: (i) an organic polyisocyanate; (ii) at least one organic polyol having a molecular weight in the range of 62 to 6000; (iii) a dispersing diol and/or diisocyanate having a pendant polyoxyethylene chain; and (iv) an isocyanate-reactive compound containing at least one carboxylic acid group and at least two groups which are more reactive than carboxylic acid groups toward isocyanate groups; and (B) an active hydrogen containing chain extender (column 2, lines 37-51).

Thus, Coogan et al forms an isocyanate-terminated polyurethane prepolymer, and then reacts the prepolymer with a chain extender.

The Examiner has particularly relied on Example 20 therein which, since neither the polyol (PTMEG (T-1000)) nor the chain extender (hydrazine) contains a free tertiary amino group (column 2, lines 52-64), is an example of the free acid group-containing water-dispersible polyurethane embodiment of Coogan et al.

Presumably, the polyurethane of Example 20 is not crosslinked, in view of the subsequent disclosure of post crosslinking (column 14, lines 30-45).

Nevertheless, said Example 20 does not contain DMPA. Nor does Example 20 contain hexamethylene diisocyanate. The two cyano groups of isophorone diisocyanate show a chemically distinct reactivity whereas those of hexamethylene diisocyanate do not. A combination of these two types of isocyanates is not disclosed in Coogan et al. In addition,

while DMPA is disclosed in other examples of Coogan et al in which a polytetrahydrofuran is present, such as Example 9, the polytetrahydrofuran in Example 9 has a molecular weight of 250, or below that of the present claims. Nor do either of presently-recited components B) or E) fall within the terms of the required dispersing diol of Coogan et al, as disclosed therein at column 5, lines 7-19. Note that every one of the examples in Coogan et al uses the same dispersing diol, i.e., one prepared by reacting Methoxycarbonyl 750 with 2,4-toluene diisocyanate (column 9, lines 1-8). Nor does Coogan et al disclose neopentyl glycol *per se*, but only as a possible reactant with a polycarboxylic acid to form a polyester polyol (paragraph bridging columns 3 and 4).

In sum, Coogan et al neither discloses nor suggests the presently-claimed invention.

Kim et al discloses, *inter alia*, (1) free-radically polymerizable, siloxane-containing urethane (meth)acrylates which comprise, in incorporated form, a) at least one compound which contains at least one active hydrogen atom and at least one free-radically polymerizable α,β -ethylenically unsaturated double bond per molecule, b) at least one diisocyanate, c) at least one compound which contains two active hydrogen atoms per molecule, d) at least one compound which contains at least one active hydrogen atom and at least one siloxane group per molecule; and (2) water-soluble or water-dispersible polymers which comprise these urethane (meth)acrylates in copolymerized form (Abstract). The urethane (meth)acrylates of Kim et al are not crosslinked polyurethanes *per se*. The above-mentioned polymers within the scope of Kim et al are water-soluble or water-dispersible polymers obtained by copolymerizing at least one of the inventive urethane (meth)acrylates and at least one free-radically polymerizable α,β -ethylenically unsaturated monomer M (column 14, line 46ff).

The Examiner holds that it would have been obvious “to combine the teachings of” Coogan et al in view of Kim et al. The Examiner finds that Coogan et al teaches the

presently-claimed polyurethane “with the specific reactants such as hexamethylene and isophorone diisocyanate, while [Kim et al] teaches making a polyurethane prepolymer with substantially the same reactants and further the specific diisocyanate reactants which can be replaced by up to 3 mol% triisocyanate. As such one of ordinary skill in the art would know that triisocyanates can be substituted for diisocyanates up to 3 mol% in polyurethane formation.”

In response to Applicants’ previous argument that it is not clear why one skilled in the art would combine Coogan et al and Kim et al, but if combined, the result would still not be the presently-claimed invention, for various reasons, the Examiner states that Kim et al is relied on only to show that it is known to substitute a portion of diisocyanates with up to 3 mol% of triisocyanate. Thus, reliance on Kim et al is now moot, since such substitution is not a limitation in the above-amended claims.

Ingrisch et al is drawn to a hybrid urethane polymer dispersion having a particular composition (column 1, line 60 through column 3, line 45). Ingrisch et al discloses their component (A)(iii) is present preferably in an amount of 0.5 to 3% by weight, and that an example of said component is dimethylolpropionic acid (column 5, lines 1-20), and that their neutralizing component (D) is preferably present in an amount of 0.15 to 1.5% by weight, which component may be N-methyl-diethanolamine (column 6, lines 25-32).

The Examiner finds that Coogan et al does not disclose a compound analogous to presently-recited component C) in the amounts of the claims, such as new Claim 21, and then holds that it would have been obvious, in effect, to vary the relative amounts of the components in Coogan et al based on the percentage ranges disclosed for the components in Ingrisch et al.

In reply, Ingrisch et al is drawn to a dispersion and not with a crosslinked polyurethane *per se*. Furthermore, the concomitant use of trimethylolpropane,

neopentylglycol and polytetrahydrofuran, as required by the above-amended claims, is not disclosed. In addition, the outcome of addition polymerization of active hydrogen containing compounds and isocyanates in the above-amended claims is different compared to Ingrisch et al. Ingrisch et al requires at least 1.2 equivalents of isocyanate for one equivalent of active hydrogen or hydroxy group (column 9, lines 5-6), while the above-amended claims recite at most 1.15 equivalents of isocyanate compound, thus yielding a copolymer with only few or no unreacted isocyanates. The present invention further distinguishes Ingrisch et al in that Ingrisch et al prepares a pre-polymer, which still requires free isocyanate moieties to be reacted in a second step with neutralizing component D and a chain extender E and a monomer having a freely polymerizable double bond.

In sum, even if Ingrisch et al were combined with Coogan et al, the result would not be the presently-claimed invention.

For all the above reasons, it is respectfully requested that the rejections be withdrawn.

The rejection of Claims 1-20 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement, is respectfully traversed. Indeed, the rejection is now moot in view of the above-discussed amendment. Accordingly, it is respectfully requested that this rejection be withdrawn.

Application No. 10/508,764
Reply to Office Action of October 22, 2008

All of the presently-pending claims in this application are now believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Customer Number

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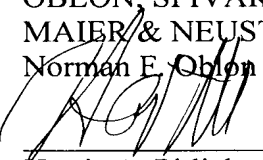
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